

No.

200700309



# THE UNITED STATES OF AMERICA

**TO ALL TO WHOM THESE PRESENTS SHALL COME:**

## Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

An application requesting a certificate of protection for an alleged distinct variety of sexually reproduced, or tuber propagated plant, the name and description of which are contained in the application and exhibits, a copy of which is hereunto annexed and made a part hereof, and the various requirements of LAW in such cases made and provided have been complied with, and the title thereto is, from the records of the PLANT VARIETY PROTECTION OFFICE, in the applicant(s) indicated in the said copy, and Whereas, upon due examination made, the said applicant(s) is (are) adjudged to be entitled to a certificate of plant variety protection under the LAW.

Now, therefore, this certificate of plant variety protection is to grant unto the said applicant(s) and the successors, heirs or assigns of the said applicant(s) for the term of TWENTY years from the date of this grant, subject to the payment of the required fees and periodic replenishment of viable basic seed of the variety in a public repository as provided by LAW, the right to exclude others from selling the variety, or offering it for sale, or reproducing it, or importing it, or exporting it, or conditioning it for propagation, or stocking it for any of the above purposes, or using it in producing a hybrid or different variety therefrom, to the extent provided by the PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD

'PHE4N'

*In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twenty-ninth day of September, in the year two thousand and ten.*

Attest:

Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

Secretary of Agriculture






U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE  
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER  <b>Pioneer Hi-Bred International, Inc.</b>		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME		3. VARIETY NAME  <b>PHE4N</b>	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)  <b>7301 NW 62<sup>nd</sup> Avenue Johnston, IA 50131-0085</b>		5. TELEPHONE (include area code)  <b>515/270-4051</b>		FOR OFFICIAL USE ONLY PVPO NUMBER <b>#200700309</b> FILING DATE <b>May 7, 2007</b>	
		6. FAX (include area code)  <b>515/253-2125</b>			
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.)  <b>Corporation</b>		8. IF INCORPORATED, GIVE STATE OF INCORPORATION  <b>Iowa</b>		9. DATE OF INCORPORATION  <b>March 5, 1999</b>	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers)  <b>Steven R. Anderson Research and Product Development P.O. Box 85-1004 Johnston, IA 50131-0085-1004</b>				F E E S R E C E I V E D FILING AND EXAMINATION FEES: \$ <b>4382.00</b> DATE <b>5/7/07</b> CERTIFICATION FEE: \$ <b>768.00</b> DATE <b>5/14/10</b>	
11. TELEPHONE (Include area code)  <b>515/270-4051</b>		12. FAX (Include area code) <b>2288</b> <b>515/253-2125</b>		13. E-MAIL  <b>steven.anderson@pioneer.com</b>	
14. CROP KIND (Common Name)  <b>Corn</b>		16. FAMILY NAME (Botanical)  <b>Gramineae</b>		18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL)  <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
15. GENUS AND SPECIES NAME OF CROP  <b>Zea Mays</b>		17. IS THE VARIETY A FIRST GENERATION HYBRID?  <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (3,000 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$4,382), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)				20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)  <input type="checkbox"/> YES (if "yes", answer items 21 and 22 below) <input checked="" type="checkbox"/> NO (if "no", go to item 23) 21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?  <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?  <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS.  <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES?  <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)				24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)?  <input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.  The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.  Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF OWNER		SIGNATURE OF OWNER  			
NAME (Please print or type)		NAME (Please print or type)  <b>Steven R. Anderson</b>			
CAPACITY OR TITLE		CAPACITY OR TITLE  <b>Research Scientist</b>		DATE  <b>5-4-2007</b>	

(See reverse for instructions and information collection burden statement)

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**GENERAL INSTRUCTIONS:** To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E, F; (3) for a tuber reproduced variety, verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in an approved public repository; and (4) payment by credit card or check drawn on a U.S. bank for \$4,382 (\$518 filing fee and \$3,864 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) **NEW:** With the application for a seed reproduced variety or by direct deposit soon after filing, the applicant must provide at least 3,000 viable untreated seeds of the variety *per se*, and for a hybrid variety at least 3,000 untreated seeds of each line necessary to reproduce the variety. Partial applications will be held in the PVPO for not more than 90 days; then returned to the applicant as un-filed. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a payment by credit card or check payable to "Treasurer of the United States" in the amount of \$768 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

**NOTES:** It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130.97.131, 97.175(h) of the Regulations and Rules of Practice.)

**Plant Variety Protection Office**  
**Telephone: (301) 504-5518 FAX: (301) 504-5291**  
**General E-mail: PVP@mail.usda.gov**  
**Homepage: <http://www.ams.usda.gov/science/pvpo/PVPindex.htm>**

#### SPECIFIC INSTRUCTIONS:

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and **provide evidence** that the permanent name of the application variety (even if it is a parental, inbred line) has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Programs, **Seed Regulatory and Testing Branch**, 801 Summit Crossing Place, Suite C, Gastonia, North Carolina 28054-2193 Telephone: (704) 810-8870. <http://www.ams.usda.gov/lsg/seed.htm>.

#### ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;  
 (2) the details of subsequent stages of selection and multiplication;  
 (3) evidence of uniformity and stability; and  
 (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
- (1) identify these varieties and state all differences objectively;  
 (2) attach replicated statistical data for characters expressed numerically and demonstrate that these are clear differences; and  
 (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

**22. CONTINUED FROM FRONT** (Please provide a statement as to the limitation and sequence of generations that may be certified.)

**23. CONTINUED FROM FRONT** (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

\* See attachment letter  
 February, 2006 (United States), November 1, 2006 (Canada, France)

**24. CONTINUED FROM FRONT** (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)  
 USPTO 1/31/2007 Application No. 11/669,297 Patent No. 7569753

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status or familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382125 (TDD). USDA is an equal opportunity provider and employer.

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DuPont Agriculture & Nutrition  
Crop Genetics Research & Development  
Research Center  
7300 N.W. 62nd Ave.  
P.O. Box 1004  
Johnston, IA 50131-1004  
(515) 270-3200 Tel

May 26, 2010

Janice Strachan  
Plant Variety Protection Office  
NAL Building, Room 400  
10301 Baltimore Blvd.  
Beltsville, MD 20705-2351

RE: PVP Field Corn Application No. 200700309, 'PHE4N'

Dear Janice Strachan:

This is in response to your letter dated May 13, 2010 and provides clarification for the information provided in Box 23. I would like to clarify and ask that you consider this additional information in regard to the date of Feb. 2006 listed in Box 23. This variety was new according to section 42 (a) (1) of the U.S Plant Variety Protection Act. On the date of filing of the application for plant variety protection, propagating or harvested material of the variety was not sold or otherwise disposed of to other persons for purposes of exploitation of the variety more than 1 year prior to the date of filing in the United States.

Based on these facts, the date listed in February 2006 was for a purpose other than the commercial exploitation of the variety.

PHE4N was the parent of three pre-commercial experimental hybrids first evaluated during the 2006 crop year under a Product Transfer and Evaluation Agreement with a one year term, effective February 9, 2006. Only hybrid seed was provided. The agreement required that the hybrids may be grown, "solely for evaluation", and required that Pioneer be provided a copy of the data and conclusions. No license or right in the hybrids was conveyed or granted under the agreement. We do not believe this constitutes commercial exploitation of the hybrid.

Regards,

Steven R. Anderson  
Research Scientist  
Pioneer Hi-Bred International  
Germplasm Security and Protection  
Maize Product Development

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**Exhibit A. Origin and Breeding History for PHE4N**

Pedigree: PH5WB/PH705)XA711322X

Pioneer Line PHE4N, *Zea mays L.*, a yellow endosperm corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross hybrid PH5WB (Certificate No. 200100254) X PH705 (Certificate No. 200200180) using the pedigree method of plant breeding. Varieties PH5WB and PH705 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing was practiced from the above hybrid for 8 generations using pedigree selection. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Princeton, Illinois as well as other Pioneer research locations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations again made for uniformity.

Variety PHE4N has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 6 generations with careful attention paid to selection criteria and uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity and stability, and for 5 generations during the final stages of inbred development and seed multiplication. Very high standards for genetic purity have been established morphologically using field observations and using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PHE4N.

The criteria used in the selection of PHE4N were yield, both per se and in hybrid combinations. Late season plant health, grain quality, stalk lodging resistance, and kernel size are especially important in production and were also important criteria considered during selection. Other selection criteria include: ability to germinate in adverse conditions, disease and insect resistance, pollen yield and tassel size.

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**Exhibit A: Developmental History for PHE4N**

Pedigree Grown Season/Year	Inbreeding Level of Pedigree Grown
PH5WB Summer 1998	F0
PH705 Summer 1998	F0
PH5WB/PH705 1998	F1
PH5WB/PH705)X Summer 1999	F2
PH5WB/PH705)XA7 Summer 2000	F3
PH5WB/PH705)XA71 Summer 2001	F4
PH5WB/PH705)XA711 Winter 2001	F5
PH5WB/PH705)XA7113 Summer 2002	F6
PH5WB/PH705)XA71132 Winter 2002	F7
PH5WB/PH705)XA711322 Summer 2003	F8
PH5WB/PH705)XA711322X	F9 (SEED)

\*PHE4N was selfed and ear-rowed from F3 through F8 generation.

#Uniformity and stability were established from F4 through F8 generation and beyond when seed supplies were increased.



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**Exhibit B: Novelty Statement**

Variety PHE4N mostly resembles Pioneer Hi-Bred International, Inc. proprietary inbred line PH5WB (PVP Certificate No. 200100254). Table 1 shows two sample t-tests on data collected primarily in Johnston and Dallas Center, Iowa in 2005 and 2006. The traits collectively show measurable differences between the two varieties.

**Exhibit B: Novelty Statement**

Variety PHE4N has a smaller cob diameter (19.9 mm vs 22.2 mm) than variety PH5WB (Table 1).

Variety PHE4N has a shorter ear length (16.4 cm vs 18.7 cm) than variety PH5WB (Table 1).

Variety PHE4N has more primary tassel branches (4.9 vs 0.8) than variety PH5WB (Table 1).

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**Exhibit B: Novelty Statement Table(s)**

Table 1: Data from Johnston and Dallas Center, Iowa in 2005 and 2006 presented by trait, across years, and broken out by year. Data are supporting evidence for differences between PHE4N and PH5WB. Varieties were grown at 2 locations in 2005 and 3 locations in 2006 where each location had different environmental conditions. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

Cob diameter (mm)																
Level	Station	Year	Variety-1	Variety-2	Cnt-1	Cnt-2	Mean-1	Mean-2	Mean_Diff	StDev-1	StDev-2	StErr-1	StErr-2	DF	t-Value	Prob_Pool
Over All			PHE4N	PH5WB	25	25	19.9	22.2	-2.3	0.600	1.190	0.120	0.238	48	-8.7	0.000
Year		2005	PHE4N	PH5WB	10	10	20.0	22.1	-2.1	0.471	0.994	0.149	0.314	18	-6.0	0.000
Year		2006	PHE4N	PH5WB	15	15	19.8	22.3	-2.5	0.676	1.335	0.175	0.345	28	-6.4	0.000
Ear length (cm)																
Level	Station	Year	Variety-1	Variety-2	Cnt-1	Cnt-2	Mean-1	Mean-2	Mean_Diff	StDev-1	StDev-2	StErr-1	StErr-2	DF	t-Value	Prob_Pool
Over All			PHE4N	PH5WB	25	25	16.4	18.7	-2.3	1.083	1.173	0.217	0.235	48	-7.1	0.000
Year		2005	PHE4N	PH5WB	10	10	17.0	18.9	-1.9	1.155	1.197	0.365	0.379	18	-3.6	0.002
Year		2006	PHE4N	PH5WB	15	15	16.1	18.6	-2.5	0.884	1.183	0.228	0.306	28	-6.6	0.000
Tassel primary branch (# of primary branches)																
Level	Station	Year	Variety-1	Variety-2	Cnt-1	Cnt-2	Mean-1	Mean-2	Mean_Diff	StDev-1	StDev-2	StErr-1	StErr-2	DF	t-Value	Prob_Pool
Over All			PHE4N	PH5WB	25	25	4.9	0.8	4.1	1.913	0.707	0.383	0.141	48	10.1	0.000
Year		2005	PHE4N	PH5WB	10	10	3.5	0.6	2.9	1.650	0.699	0.522	0.221	18	5.1	0.000
Year		2006	PHE4N	PH5WB	15	15	5.9	0.9	4.9	1.457	0.704	0.376	0.182	28	11.8	0.000

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United States Department of Agriculture, Agricultural Marketing Service  
Science and Technology, Plant Variety Protection Office  
National Agricultural Library Building, Room 400  
Beltsville, MD 20705-2351  
OBJECTIVE DESCRIPTION OF VARIETY  
CORN (Zea mays L.)

Name of Applicant(s)		Variety Seed Source		Variety Name or Temporary Designation
Pioneer Hi-Bred International, Inc				PHE4N

Address (Street & No., or R.F.D. No., City, State, Zip Code and Country)		FOR OFFICIAL USE		PVPO Number
7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085				

#200700309

Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by a "\*" are considered necessary for an adequate variety description and must be completed.

COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices; describe #25 and #26 in Comments section):

01. Light Green	06. Pale Yellow	11. Pink	16. Pale Purple	21. Buff	26. Other (Describe)
02. Medium Green	07. Yellow	12. Light Red	17. Purple	22. Tan	
03. Dark Green	08. Yellow-Orange	13. Cherry Red	18. Colorless	23. Brown	
04. Very Dark Green	09. Salmon	14. Red	19. White	24. Bronze	
05. Green-Yellow	10. Pink-Orange	15. Red & White	20. White Capped	25. Variegated (Describe)	

STANDARD INBRED CHOICES [Use the most similar (in background and maturity) of these to make comparisons based on grow-out trial data]:

Yellow Dent Families:		Yellow Dent (Unrelated):	Sweet Corn:
Family	Members	Co109, ND246	C13, Iowa5125, P39, 2132
B14	CM105, A632, B64, B68	Oh7, T232	
B37	B37, B76, H84	W117, W153R	Popcorn:
B73	N192, A679, B73, Nc268	W182BN	SG1533, 4722, HP301, HP7211
C103	Mo17, Va102, Va35, A682		
Oh43	A619, MS71, H99, Va26	White Dent:	Pipecorn:
WF9	W64A, A554, A654, Pa91	Cl66, H105, Ky228	Mo15W, Mo16W, Mo24W

1. TYPE: (describe intermediate types in "Comments" section)		Standard Inbred Name	B73
3 (1=Sweet, 2=Dent, 3=Flint, 4=Flour, 5=Pop, 6=Ornamental, 7=Pipecorn)		3 Type	

2. REGION WHERE DEVELOPED IN THE U.S.A.:		Standard Seed Source	PI 550473
2 (1=N.West, 2=N.Central, 3=N.East, 4=S.East, 5=S.Central, 6=S.West, 7=Other)		_ Region	

3. MATURITY (In Region Best Adaptability; show Heat Unit formula in "Comments" section):				
DAYS	HEAT UNITS		DAYS	HEAT UNITS
60	1,369.0 From emergence to 50% of plants in silk		62	1,436.4
59	1,324.6 From emergence to 50% of plants in pollen		61	1,397.4
2	43 From 10% to 90% pollen shed		2	59
---	From 50% silk to optimum edible quality		---	---
---	From 50% silk to harvest at 25% moisture		---	---

4. PLANT:	St.Dev.	Sample Size		Mean	St.Dev.	Sample Size
217.2 cm Plant Height (to tassel tip)	20.27	25		241.4	9.35	25
63.4 cm Ear Height (to base of top ear node)	9.96	25		103.0	10.28	25
14.6 cm Length of Top Ear Internode	1.50	25		16.6	1.71	25
0.0 Average Number of Tillers	0.00	5		0.0	0.00	5
1.0 Average Number of Ears per Stalk	0.05	5		1.1	0.07	5
4 Anthocyanin of Brace Roots: 1=Absent, 2=Faint, 3=Moderate, 4=Dark				3		

Application Variety Data	Page 1		Standard Inbred Data
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5. LEAF	St.Dev.	Sample Size	Mean	St.Dev.	Sample Size
7.9 cm Width of Ear Node Leaf	0.67	25	9.0	0.68	25
78.3 cm Length of Ear Node Leaf	6.33	25	86.9	3.91	25
6.8 Number of leaves above top ear	0.69	25	6.2	0.76	25
21.9 Degrees Leaf Angle	4.63	25	27.4	4.60	25
(Measure from 2nd leaf above ear at anthesis to stalk above leaf)					
4 Leaf Color (Munsell Code) 5GY36			4 (Munsell Code) 7.5GY34		
5 Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)			4		
— Marginal Waves (Rate on scale from 1=none to 9=many)			—		
— Longitudinal Creases (Rate on scale from 1=none to 9=many)			—		

6. TASSEL:	St.Dev.	Sample Size	Mean	St.Dev.	Sample Size
4.9 Number of Primary Lateral Branches	1.91	25	7.5	1.53	25
33.0 Degrees Branch Angle from Central Spike	9.06	25	21.6	8.43	25
59.1 cm tassel Length	4.23	25	56.2	3.25	25
(from top leaf collar to tassel tip)					
5 Pollen Shed (Rate on scale from 0=male sterile to 9=heavy shed)			5		
11 Anther Color (Munsell Code) 7.5R66			7 (Munsell Code) 5Y8.54		
2 Glume Color (Munsell Code) 5GY66			2 (Munsell Code) 5GY56		
1 Bar Glumes (Glume Bands): 1=Absent, 2=Present			1		

## 7a. EAR (Unhusked Data):

6 Silk Color (3 days after emergence) (Munsell Code)	10Y96	1 Munsell Code	2.5GY94
2 Fresh Husk Color (25 days after 50% silking) (Munsell Code)	5GY68	2 Munsell Code	5GY78
19 Dry Husk Color (65 days after 50% silking) (Munsell Code)	10YR92	21 Munsell Code	2.5Y8.54
1 Position of Ear at Dry Husk Stage: 1=Upright, 2=Horizontal, 3=Pendent		2	
6 Husk Tightness (Rate on scale from 1=very loose to 9=very tight)		7	
2 Husk Extension (at harvest): 1=Short(ears exposed), 2=Medium (<8cm), 3=Long (8-10cm beyond ear tip), 4=Very Long (>10cm)		3	

## 7b. EAR (Husked Ear Data)

	St. Dev.	Sample Size	Mean	St.Dev.	Sample Size
16.4 cm Ear Length	1.08	25	14.1	0.64	25
38.2 mm Ear Diameter at mid-point	1.68	25	46.3	1.97	25
107.9 gm Ear Weight	17.04	25	131.4	19.59	25
13.9 Number of Kernel Rows	1.47	25	18.0	1.41	25
2 Kernel Rows: 1=Indistinct, 2=Distinct			2		
1 Row Alignment: 1=Straight, 2=Slightly Curved, 3=Spiral			2		
8.8 cm Shank Length	2.08	25	10.3	2.19	25
2 Ear Taper: 1=Slight cyl., 2=Average slightly con., 3=Extreme conical			2		

## 8. KERNEL (Dried):

	St.Dev.	Sample Size	Mean	St.Dev.	Sample Size
10.9 mm Kernel Length	0.57	25	11.2	0.76	25
8.1 mm Kernel Width	0.76	25	7.3	0.56	25
5.1 mm Kernel Thickness	0.91	25	4.4	0.71	25
44.6 % Round Kernels (Shape Grade)	12.76	5	30.8	6.51	5
1 Aleurone Color Pattern: 1=Homozygous, 2=Segregating (describe)			1 (describe)		
7 Aleurone Color (Munsell Code) 10YR8/14			7 Munsell Code	2.5Y812	
7 Hard Endosperm Color (Munsell Code) 10YR7/14			7 Munsell Code	10YR712	
3 Endosperm Type: 1=Sweet(su1), 2=Extra Sweet(sh2), 3=Normal Starch, 4=High Amylose Starch, 5=Waxy Starch, 6=High Protein, 7=High Lysine, 8=Super Sweet (se), 9=High Oil, 10=Other			3 (describe)		
28.2 gm Weight per 100 kernels (unsized sample)	2.17	5	27.0	2.35	5

9. COB:	St.Dev.	Sample Size	Mean	St.Dev.	Sample Size
19.9 mm Cob Diameter at mid-point	0.60	25	27.6	0.95	25
19 Cob Color (Munsell Code) 5Y91			11 Munsell Code	10R66	

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10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); leave blank if not tested; leave Race or Strain Options blank if polygenic):

A. Leaf Blights, Wilts, and Local Infection Diseases

☐ Anthracnose Leaf Blight (*Colletotrichum graminicola*)

6 Common Rust (*Puccinia sorghi*)

9 Common Smut (*Ustilago maydis*)

Eyespot (*Kabatiella zeae*)

Goss's Wilt (*Clavibacter michiganense* spp. *nebraskensis*)

5 Gray Leaf Spot (*Cercospora zeae-maydis*)

☐ Helminthosporium Leaf Spot (*Bipolaris zeicola*)

Race \_\_\_\_\_

5 Northern Leaf Blight (*Exserohilum turcicum*)

Race \_\_\_\_\_

Southern Leaf Blight (*Bipolaris maydis*)

Race \_\_\_\_\_

Southern Rust (*Puccinia Polysora*)

5 Stewart's Wilt (*Erwinia stewartii*)

☐ Other (Specify) \_\_\_\_\_

B. Systemic Diseases

Corn Lethal Necrosis (MCMV and MDMV)

9 Head Smut (*Sphacelotheca reiliana*)

☐ Maize Chlorotic Dwarf Virus (MCDV)

☐ Maize Chlorotic Mottle Virus (MCMV)

Maize Dwarf Mosaic Virus (MDMV)

Strain \_\_\_\_\_

☐ Sorghum Downy Mildew of Corn (*Peronosclerospora sorghi*)

☐ Other (Specify) \_\_\_\_\_

C. Stalk Rots

5 Anthracnose Stalk Rot (*Colletotrichum graminicola*)

☐ Diplodia Stalk Rot (*Stenocarpella maydis*)

☐ Fusarium Stalk Rot (*Fusarium moniliforme*)

5 Gibberella Stalk Rot (*Gibberella zeae*)

☐ Other (Specify) \_\_\_\_\_

D. Ear and Kernel Rots

☐ Aspergillus Ear and Kernel Rot (*Aspergillus flavus*)

4 Diplodia Ear Rot (*Stenocarpella maydis*)

7 Fusarium Ear and Kernel Rot (*Fusarium moniliforme*)

Gibberella Ear Rot (*Gibberella zeae*)

☐ Other (Specify) \_\_\_\_\_

☐ Anthracnose Leaf Blight

Common Rust

☐ Common Smut

Eyespot

Goss's Wilt

3 Gray Leaf Spot

☐ Helminthosporium Leaf Spot

Race \_\_\_\_\_

3 Northern Leaf Blight

Race \_\_\_\_\_

Southern Leaf Blight

Race \_\_\_\_\_

Southern Rust

5 Stewart's Wilt

☐ Other (Specify) \_\_\_\_\_

Corn Lethal Necrosis

9 Head Smut

☐ Maize Chlorotic Dwarf Virus

☐ Maize Chlorotic Mottle Virus

Maize Dwarf Mosaic Virus

Strain \_\_\_\_\_

☐ Sorghum Downy Mildew of Corn

☐ Other (Specify) \_\_\_\_\_

4 Anthracnose Stalk Rot

☐ Diplodia Stalk Rot

☐ Fusarium Stalk Rot

☐ Gibberella Stalk Rot

☐ Other (Specify) \_\_\_\_\_

☐ Aspergillus Ear & Kernel Rot

3 Diplodia Ear Rot

7 Fusarium Ear & Kernel Rot

Gibberella Ear Rot

☐ Other (Specify) \_\_\_\_\_

Note: Use chart on first page to choose color codes for color traits.



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## 11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); Leave blank

if not tested	St. Dev.	Sample Size		St. Dev.	Sample Size
<input type="checkbox"/> Banks Grass Mite ( <i>Oligonychus pratensis</i> )				<input type="checkbox"/> Banks Grass Mite	
Corn Earworm ( <i>Helicoverpa zea</i> )				Corn Earworm	
<input type="checkbox"/> Leaf Feeding				<input type="checkbox"/> Leaf Feeding	
<input type="checkbox"/> Silk Feeding _____ mg larval wt.	_____	_____		<input type="checkbox"/> _____	_____
<input type="checkbox"/> Ear Damage				<input type="checkbox"/> Ear Damage	
<input type="checkbox"/> Corn Leaf Aphid ( <i>Rhopalosiphum maidis</i> )				<input type="checkbox"/> Corn Leaf Aphid	
<input type="checkbox"/> Corn Sap Beetle ( <i>Carpophilus dimidiatus</i> )				<input type="checkbox"/> Corn Sap Beetle	
European Corn Borer ( <i>Ostrinia nubilalis</i> )				European Corn Borer	
<input type="checkbox"/> 1 st Generation (Typically Whorl Leaf Feeding)				<input type="checkbox"/> 1 st Generation	
<input type="checkbox"/> 2 nd Generation (Typically Leaf Sheath-Collar Feeding)				<input type="checkbox"/> 2 nd Generation	
<input type="checkbox"/> Stalk Tunneling: _____ cm tunneled/plant	_____	_____		<input type="checkbox"/> _____	_____
Fall Armyworm ( <i>Spodoptera frugiperda</i> )				Fall Armyworm	
<input type="checkbox"/> Leaf-Feeding				<input type="checkbox"/> Leaf-Feeding	
<input type="checkbox"/> Silk-Feeding _____ mg larval wt.	_____	_____		<input type="checkbox"/> _____	_____
<input type="checkbox"/> Maize Weevil ( <i>Sitophilus zeamais</i> )				<input type="checkbox"/> Maize Weevil	
<input type="checkbox"/> Northern Rootworm ( <i>Diabrotica barberi</i> )				<input type="checkbox"/> Northern Rootworm	
<input type="checkbox"/> Southern Rootworm ( <i>Diabrotica undecimpunctata</i> )				<input type="checkbox"/> Southern Rootworm	
Southwestern Corn Borer ( <i>Diatraea grandiosella</i> )				Southwestern Corn Borer	
<input type="checkbox"/> Leaf Feeding				<input type="checkbox"/> Leaf Feeding	
<input type="checkbox"/> Stalk Tunneling: _____ cm tunneled/plant	_____	_____		<input type="checkbox"/> _____	_____
<input type="checkbox"/> Two-spotted Spider Mite ( <i>Tetranychus urticae</i> )				<input type="checkbox"/> Two-spotted Spider Mite	
<input type="checkbox"/> Western Rootworm ( <i>Diabrotica virgifera virgifera</i> )				<input type="checkbox"/> Western Rootworm	
<input type="checkbox"/> Other (Specify) _____				<input type="checkbox"/> Other (Specify) _____	

## 12. AGRONOMIC TRAITS:

<input checked="" type="checkbox"/> Stay Green (at 65 days after anthesis) (Rate on scale from 1=worst to 9=excellent)		<input checked="" type="checkbox"/> Stay Green
<input type="checkbox"/> % Dropped Ears (at 65 days after anthesis)		<input type="checkbox"/> % Dropped ears
<input type="checkbox"/> % Pre-anthesis Brittle Snapping		<input type="checkbox"/> % Pre-anthesis Brittle Snapping
<input checked="" type="checkbox"/> % Pre-anthesis Root Lodging		<input checked="" type="checkbox"/> % Pre-anthesis Root Lodging
<input type="checkbox"/> % Post-anthesis Root Lodging (at 65 days after anthesis)		<input type="checkbox"/> Post-anthesis Root Lodging
<u>5,327.0</u> Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture)		<u>5,538.0</u> Yield

## 13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied.)

1 Isozymes                      ☐ RFLP's                      ☐ RAPD's                      ☐ Other (Specify) \_\_\_\_\_

## REFERENCES:

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- Stringfield, G.H. Maize Inbred Lines of Ohio A.E.S., Bul. 831. 1959.
- U.S. Department of Agriculture 1936, 1937. Yearbook.

## COMMENTS (e. g. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D)

Insect, disease, brittle snapping and root lodging data are collected mainly from environment where variability for the trait can be obtained within the experiment.

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## CLARIFICATION OF DATA IN EXHIBITS B AND C

Please note the data presented in Exhibit B and C, "Objective Description of Variety," are collected primarily at Johnston and Dallas Center, Iowa. The data in Table 1 are from two sample t-tests using data collected in Johnston and Dallas Center, IA. These traits in exhibit B collectively show distinct differences between the two varieties.

Our experimental design was set up in a typical complete block design commonly used in agricultural corn research experiments with one replication grown at each location. The experiment procedures generally involve three locations/environments with different planting dates, planted in 17.42 ft. rows with 2 rows for each variety. Approximately 24-30 plants emerged in each of 2 rows for a total of around 48 to 60 plants being evaluated at each location and 144 to 180 plants across locations. For plant level traits, we sampled 5 representative plants from the 2 rows of the 2 row plot (group) of plants at each location. For plot level traits we evaluated the 2 row plot (group) and gave a representative score or average on the 48-60 plants in the group within an experiment. One of the 3 locations was dropped in 2005 due to poor emergence and field conditions.

Month	GROWING DEGREE UNITS (GDU's)				PRECIPITATION (Inches)			
	2005		2006		2005		2006	
	D. Center	Johnston	D. Center	Johnston	D. Center	Johnston	D. Center	Johnston
May	356	388	390	460	5.04	6.63	1.23	1.22
June	677	729	643	667	1.52	6.85	0.37	1.08
July	711	788	779	816	2.84	5.02	5.19	5.39
August	626	725	671	754	2.31	1.98	5.85	4.7
September	526	585	361	417	2.01	2.81	4.59	3.98
TOTAL	2896	3215	2844	3114	13.72	23.29	17.23	16.37

YEAR	PLANTING DATES		
	DC	JH-1	JH-2
2005	6-May	3-May	10-May
2006	12-May	4-May	10-May

Calculate GDU's

Growing Degree Units use the following formula:  $GDU = ((T1+T2)/2)-50$

- Where T1 = minimum temperature for a given day with 50 degrees Fahrenheit as the minimum temperature used and 86 degrees Fahrenheit is the maximum temperature used.
- Where T2 = maximum temperature for a given day with 86 degrees Fahrenheit as the maximum temperature used and 50 degrees Fahrenheit is the minimum temperature used.

GDU's are calculated each day and accumulated (summed) over certain number of days.

NOTE: In general, cases where less than 10 observations are presented the trait was collected at the plot level as it has been done in the past. This means many more plants were visually evaluated according to the procedure outlined above, and then a score of the "population" of the plants was recorded for each location. We have adjusted our current process to sample at least 15 plants for plant-level traits at a location.



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U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**  
**STATEMENT OF THE BASIS OF OWNERSHIP**

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S)  <b>PIONEER HI-BRED INTERNATIONAL, INC.</b>	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME  <b>PHE4N</b>
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country)  <b>7301 NW 62<sup>nd</sup> AVENUE P.O. BOX 85 JOHNSTON, IA 50131-0085</b>	5. TELEPHONE (include area code)  <b>515-270-4051</b>	6. FAX (include area code)  <b>515-253-2125</b>
7. PVPO NUMBER		<b>#200700309</b>

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain: ☒ YES ☐ NO9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country. ☒ YES ☐ NO10. Is the applicant the original owner? ☒ YES ☐ NO If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☐ YES ☐ NO If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☒ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

Pioneer Hi-Bred International, Inc. (PHI), Des Moines, Iowa, and/or its wholly owned subsidiary Pioneer Overseas Corporation (POC), Des Moines, Iowa, is the employer of the plant breeders involved in the selection and development of PHE4N. Pioneer Hi-Bred International and/or Pioneer Overseas Corporation has the sole rights and ownership of PHE4N pursuant to written contracts that assign all rights in the variety to PHI and/or POC at the time such variety was created. No rights to this variety are retained by any individuals.

**PLEASE NOTE:**

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14<sup>th</sup> and Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal employment opportunity provider and employer.

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According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14<sup>th</sup> and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal employment opportunity provider and employer.

**U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
SCIENCE AND TECHNOLOGY  
PLANT VARIETY PROTECTION OFFICE  
BELTSVILLE, MD 20705**

**EXHIBIT F  
DECLARATION REGARDING DEPOSIT**

NAME OF OWNER (S)  <b>Pioneer Hi-Bred International, Inc.</b>	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country)  <b>7301 NW 62<sup>nd</sup> Avenue Johnston, IA 50131-0085</b>	TEMPORARY OR EXPERIMENTAL DESIGNATION  VARIETY NAME  <b>PHE4N</b>
NAME OF OWNER REPRESENTATIVE (S)  <b>Steven R. Anderson</b>	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country)  <b>7301 NW 62<sup>nd</sup> Avenue Johnston, IA 50131-0085</b>	FOR OFFICIAL USE ONLY  PVPO NUMBER <b>#200700309</b>

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

  
Signature

5-4-2007  
Date



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